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# मानक

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IS 4945-2 (1968): Cotton Twines for Fish Nets, Part II:  
Twines for Trawl Nets [TXD 18: Textile Materials for  
Marine-Fishing Purposes]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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**IS: 4945 ( Part II ) - 1968**

(Reaffirmed 2003)

*Indian Standard*

**SPECIFICATION FOR  
COTTON TWINES FOR FISH NETS**

**PART II , TWINES FOR TRAWL NETS**

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**INDIAN STANDARDS INSTITUTION**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

*March 1969*

# Indian Standard

## SPECIFICATION FOR COTTON TWINES FOR FISH NETS

### PART II TWINES FOR TRAWL NETS

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**IS: 4945 (Part II) - 1968**

***Indian Standard***  
**SPECIFICATION FOR**  
**COTTON TWINES FOR FISH NETS**  
**PART II TWINES FOR TRAWL NETS**

**0. FOREWORD**

**0.1** This Indian Standard (Part II) was adopted by the Indian Standards Institution on 26 November 1968, after the draft finalized by the Textile Materials for Fishing Purposes Sectional Committee had been approved by the Textile Division Council.

**0.2** This standard is based on the data for cotton fish net twines supplied by the Central Institute for Fisheries Technology, Ernakulam.

**0.3** This standard contains clause 5.1, which calls for agreement between the buyer and the seller for permitting him to use his option for selection to suit his requirements.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS:2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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**1. SCOPE**

**1.1** This standard (Part II) prescribes constructional details and other particulars of 2 types of cotton twines used in the manufacture of trawl nets.

**2. TYPES**

**2.1** Cotton twines used for making trawl nets shall be classified as 'Hard' and 'Extra-Hard' depending upon the twist imparted to the twines.

**3. MANUFACTURE**

**3.1 Yarn** — Cotton yarn used in the manufacture of twines shall be of the quality suitable for the purpose.

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\*Rules for rounding off numerical values (*revised*).

**IS: 4945 (Part II) - 1968**

**3.2 Twines**—The twines and its components shall be evenly and uniformly twisted together. They shall be free from kinks and other projections.

**4. REQUIREMENTS**

**4.1 Construction**—The twines of the 2 types shall comply with the requirements of Tables 1, 1A, 2 and 2A respectively.

**4.2 Turns per Metre**—The turns per metre values of the twines shall be determined according to 8.2 or 8.3 of IS: 832-1964\*.

**4.3 Breaking Load**—The dry and wet breaking load of the twines shall be determined according to 7.1 to 7.6 of IS: 1670-1960† using a gauge length of 20 cm. The wet breaking load shall be determined by immersing the twines for 24 hours in fresh water.

**4.4 Knot Breaking Load**—The dry and wet knot breaking load of the twines shall be determined by the method prescribed in Appendix A.

**5. PACKAGING**

**5.1** Twines shall be made into hanks or cheeses as required by the buyer. If hank packing is required, the twines shall be made into hanks and a suitable number of such hanks shall be packed in bundles each weighing 4.5 kg. The cheeses and bundles shall be packed in waterproof kraft paper or other suitable waterproof material as may be agreed to between the buyer and the seller.

**6. MARKING**

**6.1** Cheeses or bundles containing twines shall be marked with the following information:

- a) Name of the material;
- b) Type and construction;
- c) Net weight of package;
- d) Year of manufacture; and
- e) Manufacturer's name, initials or trade-mark, if any.

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\*Method for determination of twist in yarn.

†Method for determination of breaking load (strength), elongation at break and tenacity of single strand of cotton yarn (by constant-rate-of-traverse machine) (Since revised).

TABLE 1 REQUIREMENTS OF COTTON TWINES, HARD, WITH  
ZSZ TWIST  
(Class 4.1)

CONSTRUCTION (NOMINAL COUNT)	TURNS PER METRE		BREAKING LOAD ON 20 cm TEST LENGTH, kg, Min		KNOT BREAKING LOAD ON 20 cm TEST LENGTH, kg, Min			
	Outer	Inner	TEST LENGTH, kg, Min		Trawl		Reef	
			Dry	Wet	Dry	Wet	Dry	Wet
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
59 tex $\times$ 5 $\times$ 3 (or 10s/5/3)	226	810	12.0	12.3	8.8	11.0	10.3	11.5
59 tex $\times$ 6 $\times$ 3 (or 10s/6/3)	202	725	14.4	14.7	10.6	13.2	12.4	13.8
59 tex $\times$ 7 $\times$ 3 (or 10s/7/3)	191	680	16.8	17.2	12.3	15.5	14.5	16.1
30 tex $\times$ 2 $\times$ 2 (or 20s/2/2)	595	2 140	1.6	1.6	1.17	1.48	1.38	1.53
30 tex $\times$ 2 $\times$ 3 (or 20s/2/3)	503	1 800	2.4	2.5	1.76	2.22	2.07	2.30
30 tex $\times$ 3 $\times$ 3 (or 20s/3/3)	410	1 470	3.6	3.7	2.63	3.33	3.10	3.45
30 tex $\times$ 4 $\times$ 3 (or 20s/4/3)	354	1 268	4.8	4.9	3.52	4.45	4.15	4.60
30 tex $\times$ 5 $\times$ 3 (or 20s/5/3)	319	1 140	6.0	6.2	4.42	5.55	5.18	5.74
30 tex $\times$ 6 $\times$ 3 (or 20s/6/3)	288	1 032	7.2	7.3	5.30	6.65	6.22	6.90
30 tex $\times$ 7 $\times$ 3 (or 20s/7/3)	268	960	8.4	8.6	6.16	7.76	7.25	8.05
30 tex $\times$ 8 $\times$ 3 (or 20s/8/3)	250	895	9.6	9.8	7.05	8.90	8.30	9.2
30 tex $\times$ 9 $\times$ 3 (or 20s/9/3)	236	842	10.8	11.0	7.90	10.00	9.30	10.35
30 tex $\times$ 10 $\times$ 3 (or 20s/10/3)	225	805	12.0	12.3	8.80	11.10	10.35	11.5
30 tex $\times$ 12 $\times$ 3 (or 20s/12/3)	204	733	14.4	14.7	10.55	13.3	12.40	13.8
30 tex $\times$ 15 $\times$ 3 (or 20s/15/3)	183	654	18.0	18.4	13.2	16.6	15.55	17.3
30 tex $\times$ 20 $\times$ 3 (or 20s/20/3)	158	567	24.0	24.6	17.6	22.2	20.60	23.0



TABLE 1A REQUIREMENTS OF COTTON TWINES, HARD,  
WITH 22S TWIST

(Class 4.1)

CONSTRUCTION (NOMINAL COUNT)	TURNS PER METRE		BREAKING LOAD ON 20 cm TEST LENGTH, kg, Min		KNOT BREAKING LOAD ON 20 cm TEST LENGTH, kg, Min			
	Outer	Inner	TEST LENGTH, kg, Min		Trawl		Reef	
			Dry	Wet	Dry	Wet	Dry	Wet
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
59 tex $\times$ 5 $\times$ 3 (or 10s/5/3)	256	520	11.8	12.6	9.6	11.0	10.4	11.4
59 tex $\times$ 6 $\times$ 3 (or 10s/6/3)	232	455	14.2	15.2	11.4	13.2	12.4	13.8
59 tex $\times$ 7 $\times$ 3 (or 10s/7/3)	218	420	16.4	17.6	13.4	15.4	14.6	16.2
30 tex $\times$ 2 $\times$ 2 (or 20s/2/2)	677	1 625	1.56	1.67	1.28	1.48	1.38	1.5
30 tex $\times$ 2 $\times$ 3 (or 20s/2/3)	572	1 350	2.34	2.5	1.92	2.22	2.07	2.3
30 tex $\times$ 3 $\times$ 3 (or 20s/3/3)	467	1 150	3.52	3.8	2.91	3.3	3.1	3.4
30 tex $\times$ 4 $\times$ 3 (or 20s/4/3)	405	915	4.70	5.0	3.85	4.4	4.2	4.6
30 tex $\times$ 5 $\times$ 3 (or 20s/5/3)	363	795	5.9	6.3	4.82	5.5	5.2	5.7
30 tex $\times$ 6 $\times$ 3 (or 20s/6/3)	330	715	7.1	7.6	5.7	6.6	6.2	6.9
30 tex $\times$ 7 $\times$ 3 (or 20s/7/3)	306	650	8.2	8.8	6.7	7.7	7.3	8.1
30 tex $\times$ 8 $\times$ 3 (or 20s/8/3)	286	600	9.4	10.0	7.7	8.9	8.3	9.2
30 tex $\times$ 9 $\times$ 3 (or 20s/9/3)	270	555	10.6	11.3	8.7	10.0	9.3	10.3
30 tex $\times$ 10 $\times$ 3 (or 20s/10/3)	258	525	11.7	12.5	9.6	11.1	10.4	11.5
30 tex $\times$ 12 $\times$ 3 (or 20s/12/3)	234	460	14.1	15.0	11.6	13.3	12.4	13.8
30 tex $\times$ 15 $\times$ 3 (or 20s/15/3)	210	394	17.6	18.8	14.5	16.6	15.6	17.3
30 tex $\times$ 18 $\times$ 3 (or 20s/18/3)	191	346	21.2	22.6	17.3	20.0	18.6	20.7
30 tex $\times$ 20 $\times$ 3 (or 20s/20/3)	181	320	23.4	25.0	19.3	22.2	20.6	23.0

**TABLE 2 REQUIREMENTS OF COTTON TWINES, EXTRA-HARD, WITH  
ZSZ TWIST**  
( Clause 4.1 )

CONSTRUCTION ( NOMINAL COUNT )	TURNS PER METRE		BREAKING LOAD ON 20 cm TEST LENGTH, kg, Min		KNOT BREAKING LOAD ON 20 cm TEST LENGTH, kg, Min			
	Outer	Inner	TEST LENGTH, kg, Min		Trawl		Reef	
			Dry	Wet	Dry	Wet	Dry	Wet
( 1 )	( 2 )	( 3 )	( 4 )	( 5 )	( 6 )	( 7 )	( 8 )	( 9 )
59 tex $\times$ 5 $\times$ 3 ( or 10s/5/3 )	256	915	9.0	9.8	7.7	10.5	9.1	11.5
59 tex $\times$ 6 $\times$ 3 ( or 10s/6/3 )	232	830	10.8	11.6	8.2	12.6	10.9	13.8
59 tex $\times$ 7 $\times$ 3 ( or 10s/7/3 )	218	780	12.6	13.8	10.8	14.8	12.7	16.0
30 tex $\times$ 2 $\times$ 2 ( or 20s/2/2 )	678	2 430	1.2	1.3	1.02	1.4	1.21	1.53
30 tex $\times$ 2 $\times$ 3 ( or 20s/2/3 )	573	2 045	1.8	1.9	1.54	2.1	1.81	2.30
30 tex $\times$ 3 $\times$ 3 ( or 20s/3/3 )	468	1 680	2.7	2.8	2.31	3.2	2.73	3.45
30 tex $\times$ 4 $\times$ 3 ( or 20s/4/3 )	406	1 455	3.6	3.9	3.08	4.2	3.64	4.60
30 tex $\times$ 5 $\times$ 3 ( or 20s/5/3 )	363	1 300	4.5	4.9	3.86	5.3	4.5	5.74
30 tex $\times$ 6 $\times$ 3 ( or 20s/6/3 )	330	1 180	5.4	5.8	4.14	6.3	5.4	6.90
30 tex $\times$ 7 $\times$ 3 ( or 20s/7/3 )	306	1 095	6.3	6.9	5.40	7.4	6.4	8.0
30 tex $\times$ 8 $\times$ 3 ( or 20s/8/3 )	287	1 025	7.2	7.8	6.16	8.4	7.3	9.2
30 tex $\times$ 9 $\times$ 3 ( or 20s/9/3 )	267	965	8.1	8.8	6.95	9.5	8.2	10.3
30 tex $\times$ 10 $\times$ 3 ( or 20s/10/3 )	258	920	9.0	9.8	7.70	10.5	9.1	11.5
30 tex $\times$ 12 $\times$ 3 ( or 20s/12/3 )	234	835	10.8	11.5	9.20	12.6	10.9	13.8
30 tex $\times$ 15 $\times$ 3 ( or 20s/15/3 )	209	750	13.5	14.3	11.5	15.8	13.70	17.2
30 tex $\times$ 18 $\times$ 3 ( or 20s/18/3 )	190	680	16.2	17.2	13.9	19.0	16.4	20.7
30 tex $\times$ 20 $\times$ 3 ( or 20s/20/3 )	181	648	18.0	19.0	15.5	21.1	18.3	23.0

TABLE 2A REQUIREMENTS OF COTTON TWINES, EXTRA-HARD,  
WITH ZS TWIST

(Clause 4.1)

CONSTRUCTION (NOMINAL COUNT)	TURNS PER METRE		BREAKING LOAD ON 20 cm TEST LENGTH, kg, Min		KNOT BREAKING LOAD ON 20 cm TEST LENGTH, kg, Min			
	Outer	Inner	TEST LENGTH, kg, Min		Trawl		Reef	
			Dry	Wet	Dry	Wet	Dry	Wet
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
59 tex $\times$ 5 $\times$ 3 (or 10s/3/3)	290	615	11.4	11.2	9.0	10.6	9.0	11.4
59 tex $\times$ 6 $\times$ 3 (or 10s/6/3)	260	535	13.6	13.8	10.8	13.6	10.8	13.8
59 tex $\times$ 7 $\times$ 3 (or 10s/7/3)	246	490	15.8	16.2	12.8	14.8	12.8	16.2
30 tex $\times$ 2 $\times$ 2 (or 20s/2/2)	765	1910	1.5	1.5	1.21	1.4	1.21	1.5
30 tex $\times$ 2 $\times$ 3 (or 20s/2/3)	645	1560	2.3	2.3	1.81	2.1	1.81	2.3
30 tex $\times$ 3 $\times$ 3 (or 20s/3/3)	526	1240	3.4	3.5	2.73	3.2	2.73	3.4
30 tex $\times$ 4 $\times$ 3 (or 20s/4/3)	456	1120	4.5	4.6	3.64	4.2	3.64	4.6
30 tex $\times$ 5 $\times$ 3 (or 20s/5/3)	408	920	5.7	5.6	4.5	5.3	4.5	5.7
30 tex $\times$ 6 $\times$ 3 (or 20s/6/3)	371	820	6.8	6.9	5.4	6.3	5.4	6.9
30 tex $\times$ 7 $\times$ 3 (or 20s/7/3)	345	750	7.9	8.1	6.4	7.4	6.4	8.1
30 tex $\times$ 8 $\times$ 3 (or 20s/8/3)	322	690	9.0	9.2	7.3	8.4	7.3	9.2
30 tex $\times$ 9 $\times$ 3 (or 20s/9/3)	304	640	10.1	10.3	8.2	9.5	8.2	10.3
30 tex $\times$ 10 $\times$ 3 (or 20s/10/3)	290	605	11.3	11.3	9.1	10.5	9.1	11.5
30 tex $\times$ 12 $\times$ 3 (or 20s/12/3)	263	535	13.5	13.8	10.9	12.6	10.9	13.8
30 tex $\times$ 15 $\times$ 3 (or 20s/15/3)	235	465	16.9	17.2	13.70	15.8	13.70	17.3
30 tex $\times$ 18 $\times$ 3 (or 20s/18/3)	215	410	20.2	20.6	16.4	19.0	16.4	20.7
30 tex $\times$ 20 $\times$ 3 (or 20s/20/3)	204	382	22.6	23.0	18.3	21.1	18.3	23.0

## IS: 4945 (Part II) - 1968

6.1.1 Each cheese or bundle may also be marked with the ISI Certification mark.

**Note** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## 7. PACKING

7.1 A suitable number of cheeses or bundles shall be placed one over the other and wrapped with a layer of waterproof packing material, such as waterproof packing paper or polyethylene film, to form a pack. The pack shall be tied with twine of adequate strength and a suitable number of such packs shall be placed in a container of adequate strength which is previously lined with one layer of waterproof packing paper (*see* Grade 2 of IS:1398-1960\*). If necessary, the voids in the container may be stuffed with cushioning material to avoid damage in transit. The container shall be bound by iron hoops or wire.

## 8. SAMPLING

8.1 The quantity of cotton twine of the same construction and quality delivered to a buyer against a despatch note shall constitute a lot.

8.2 The conformity of the lot to the requirements of this standard shall be determined on the basis of the tests carried out on the samples selected from the lot.

8.3 Unless otherwise agreed to between the buyer and the seller, the number of hanks or cheeses to be selected at random from a lot shall be in accordance with Table 3.

TABLE 3 NUMBER OF HANKS OR CHEESES TO BE SELECTED

NUMBER OF HANKS OR CHEESES IN THE LOT	NUMBER OF HANKS OR CHEESES TO BE SELECTED	PERMISSIBLE NUMBER OF DEFECTIVES
(1)	(2)	(3)
Up to 100	3	0
101 " 300	4	0
301 " 500	5	0
501 " 1000	7	0
1001 " 3000	10	1
3001 and above	15	1

\*Specification for paper packing, waterproof, bitumen-laminated. (Since revised).

**IS:4945 (Part II) - 1968**

**8.4** From each of the hanks or cheeses selected according to 8.3, five test specimens for each of the characteristics shall be tested.

**8.4.1** From the test results for each hank or cheese, the average for a particular characteristic shall be calculated and compared with the corresponding value specified to determine the conformity or otherwise of the hank or cheese.

**8.5 Criteria for Conformity**—The lot shall be considered conforming to the requirements if the number of hanks or cheeses not meeting the requirements for one or more of the characteristics is less than or equal to the corresponding number given in col 3 of Table 3.

## **APPENDIX A**

*(Clause 4.4)*

### **METHOD FOR DETERMINATION OF KNOT BREAKING LOAD (WET AND DRY)**

#### **A-1. TEST SPECIMENS**

**A-1.1** For the purpose of this test, a length of twine of approximately 30 cm cut from each cheese or hank in the test sample shall constitute the test specimens.

#### **A-2. CONDITIONING OF TEST SPECIMENS**

**A-2.1** Prior to test, the test specimens shall be conditioned in a standard atmosphere at  $65 \pm 2$  percent relative humidity and  $27^\circ \pm 2^\circ\text{C}$  temperature (see IS:196-1966\*) for at least 24 hours.

#### **A-3. APPARATUS**

**A-3.1** A constant-rate-of-traverse type single strand strength testing machine (preferably power-driven) of appropriate capacity, the speed of the moving clamp of which is equal to  $300 \pm 15$  mm/min, shall be used for this test.

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\*Atmospheric conditions for testing (*revised*).

**IS: 4945 (Part II) - 1968**

**A-4. PROCEDURE**

**A-4.1** Mount one test specimen on the breaking load testing machine, making in the twine a trawl knot or a reef knot in such a way that the knot is approximately positioned in the centre of the test specimen and the distance between the clamps is kept equal to 20 cm. Start the machine and carry the test to rupture. Note the breaking load of the test specimen correct to the nearest 0.1 kg.

**A-4.2** Repeat the test with the remaining test specimens.

**NOTE**— The test shall take into account only the actual breaks which occur clear of the grips of the machine. Should rupture occur within 10 cm of either grip at less than the specified breaking load, the specimen shall be discarded and another specimen tested.

**A-5. WET KNOT BREAKING LOAD**

**A-5.1** Repeat the procedure prescribed in A-4.1 but substituting the test specimens with the ones that have been kept immersed for 24 hours in fresh water, the test being carried out after blotting out the adhering water.

## INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

### Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

### Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

### Derived Units

Quantity	Unit	Symbol	Conversion
Force	newton	N	1 N = 1 kg·1 m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N·m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V·s
Flux density	tesla	T	1 T = 1 Wb/m <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 c/s (s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>

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1-8-36, 57 L. N. Gupta Marg	HYDERABAD 500001	22 10 53
O 221 Todarmal Marg, Banipark	JAIPUR 302006	7 63 16
117/418 B Sarvodaya Nagar	KANPUR 208005	62 72
B.C.I. Bldg (3rd Floor), Gandhi Maidan East	PATNA 800004	5 36 55
HanTex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 696001	32 27

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